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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,994	04/15/2004	Steven E. Ready	A2242-US-DIV	7265
33726	7590	03/23/2006	EXAMINER	
BEVER, HOFFMAN & HARMS, LLP 1432 CONCANNON BLVD., BLDG. G LIVERMORE, CA 94550			NGUYEN, LAM S	
			ART UNIT	PAPER NUMBER
			2853	
DATE MAILED: 03/23/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/824,994	READY ET AL.	
	Examiner	Art Unit	
	LAM S. NGUYEN	2853	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 March 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/03/2006 has been entered.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-2, 6, 10-11, and 15 rejected under 35 U.S.C. 102(b) as being anticipated by Fujimoto et al. (US 6390597).

#### **Referring to claims 1, 10:**

Fujimoto et al. discloses a printing system comprising:

a stage (*FIG. 12, element 72*) for supporting a substrate (*FIG. 12, element S*);

a print head (*FIG. 11, element 300*) including:

an ejector base (*FIG. 3, element 10*), and

a plurality of ejectors (*FIG. 3, elements 25a-d*) mounted in the ejector base

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(FIG. 3, element 10);

means for moving the print head in a first print direction and a second print direction across a substrate without changing a rotational orientation of the print head relative to the substrate, the first print direction and the second print direction being nonparallel (FIG. 11: *The printhead (300) moves in the MAIN SCANNING DIRECTION (first direction) and relatively moves in the SUB SCANNING DIRECTION (second direction), wherein the main scanning direction and the sub-scanning direction are nonparallel*); and

means for causing the plurality ejectors to selectively eject material toward the substrate when the print head is moving in either of the first printing direction and the second printing direction (column 7, line 60 to column 8, line 1: *In accordance to printing data, the driver applies a drive voltage to a specified (selected) piezoelectric element to cause ink ejected via a corresponding nozzle to perform printing while the printhead 300 moves in the main scanning direction*), wherein the first plurality of ejectors are arranged on the ejector base in a first line, the first line being diagonal to the first print direction and the second print direction (FIG. 2: *The plurality of ejectors (101) are arranged along a line that is diagonal respect to either the main scanning direction (first direction) or the sub-scanning direction (second direction)*). FIG. 5A: *The first plurality of ejector is 16d, for example*).

**Referring to claims 2, 11:** wherein the first print direction and the second print direction are orthogonal (FIG. 1-2: *The main scanning direction (first direction) and the sub-scanning direction (second direction) are orthogonal*).

**Referring to claims 6, 15:** further comprising a second plurality of ejectors (FIG. 5A: *The second plurality of ejector is 16c, for example*) mounted in the ejector base (FIG. 5A), the

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second plurality of ejectors being arranged in a second line, the second line being parallel to the first line (*FIG. 5A: The nozzle array lines 16c-d are parallel*), wherein each of the first plurality of ejectors and the second plurality of ejectors has a unique position in the first print direction (*FIG. 5A: Each ejector/nozzle in each nozzle array prints an unique position in the main scanning direction (first direction)*).

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1, 4, 6-10, 13, 15-20 are rejected under 35 U.S.C. 102(a) as being anticipated by Katagami et al. (US 2002/0105688 A1).

**Referring to claims 1, 10:**

Katagami et al. discloses a printing system comprising:

a stage (*FIG. 9, element 49*) for supporting a substrate (*FIG. 9, element 12*);

a print head (*FIG. 9, element 22*) including:

an ejector base (*FIG. 4, element 25*), and

a plurality of ejectors (*FIG. 4, elements 28*) mounted in the ejector base

(*FIG. 4, element 25*);

means for moving the print head in a first print direction and a second print direction across a substrate without changing a rotational orientation of the print head relative to the substrate, the first print direction and the second print direction being nonparallel (*FIG. 9: The printhead (22) moves in the X direction (first direction) and relatively moves in the Y direction (second direction), wherein the X and Y directions are nonparallel*); and

means for causing the plurality ejectors to selectively eject material toward the substrate when the print head is moving in either of the first printing direction and the second printing direction (*paragraph [0012]: "Selectively discharge ink from each of nozzles 304 during each time of main scanning", wherein the main scanning is the first direction*), wherein the first plurality of ejectors are arranged on the ejector base in a first line, the first line being diagonal to the first print direction and the second print direction (*FIG. 1: The plurality of ejectors (27) are arranged in the leftmost array (20) along a line that is diagonal respect to either the X direction (first direction) or the Y direction (second direction)*).

**Referring to claims 4, 13:** further comprising means for causing the print head to print an IC pattern (*FIG. 1, element 11*) on the substrate (*FIG. 1, element 12*), wherein a first spacing between each of the first plurality of ejectors in the first print direction is an integer multiple of a first design rule of the IC pattern (*Paragraph [0052] teaches the nozzle (ejector) pitch of the nozzles belonging to each head is coincided with the element pitch formed on the substrate. As shown in FIG. 1, the spacing between two adjacent ejectors 27 in the X direction equals to the spacing between two adjacent printed elements 7 in the X direction (the first design rule). In this case the integer multiple value is one*), and wherein a second spacing between each of the first plurality of ejectors in the second print direction is an integer multiple of a second design rule of the IC pattern (*Paragraph [0052] teaches the nozzle (ejector) pitch of the nozzles belonging to each head is coincided with the element pitch formed on the substrate. As shown in FIG. 1, the spacing between two adjacent ejectors 27 in the Y direction equals to the spacing between two adjacent printed elements 7 in the Y direction (the second design rule). In this case the integer multiple value is one*).

**Referring to claims 6, 15:** further comprising a second plurality of ejectors (*FIG. 1: The ejectors 27 in the second leftmost array 20*) mounted in the ejector base (*FIG. 1, element 25*), the second plurality of ejectors being arranged in a second line, the second line being parallel to the first line (*FIG. 1: The leftmost array and the second leftmost array are parallel*), wherein each of the first plurality of ejectors and the second plurality of ejectors has a unique position in the first print direction (*FIG. 1: Each ejector 27 in the leftmost array and the second leftmost array prints an unique position in the X direction*).

**Referring to claims 7, 16:** further comprising a third plurality of ejectors mounted in the ejector base, the third plurality of ejectors being arranged in a third line, the third line being parallel to the first line (*FIG. 1: The third leftmost ejector array 20*), wherein each of the first plurality of ejectors and the third plurality of ejectors has a unique position in the second print direction (*FIG. 1: Each ejector 27 in the leftmost array 20 and the third leftmost array (20) prints an unique position on the Y direction per a main scanning. After a main scanning completes, the substrate is relatively moved in the Y direction (sub-scanning) with an amount corresponding to the total length of the six nozzle rows 28, and the arrays print other unique positions respect to the Y direction*).

**Referring to claims 8-9, 17-18:** further comprising means for causing the plurality of ejectors to print a phase change material for a semiconductor process mask or a solution-processable electronic materials to form an integrated circuit (*paragraph [0216-0217]: Dielectric material or a semiconductor material can be discharged from the printhead to form various semiconductor devices*). (*In addition, because the applicant admits that "Depending on the type and intended use of the printed pattern being formed, the printing fluid can comprise a*

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*variety of material, including phase-change materials such as wax or photoresist (to form semiconductor process masks), and colloidal suspensions such as solution-processable electronic (i.e., conducting, semiconducting, or dielectric) materials, and organic or inorganic materials (e.g., to form IC features)" (specification, paragraph [0038]), the claim elements do not carry patentability weight).*

**Referring to claims 19-20:** further comprising means for aligning the plurality of ejectors to the substrate before causing the plurality of ejectors to selectively eject said material toward the substrate, wherein said means for aligning comprises a camera mounted on said means for moving (*FIG. 9, element 81 and paragraph [0125]: The head camera observes the board (substrate) 12 for the purpose of aligning/positioning the printhead to the drawing start position*).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 3 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujimoto et al. (US 6390597) in view of Minowa et al. (US 5936648).

Fujimoto et al. discloses the claimed invention as discussed above except wherein the first line is at a 45-degree angle with respect to the first print direction and the second print direction.



Minowa et al. discloses a printing apparatus having a printhead (*FIG. 5, element 30*) including a nozzle array (*FIG. 5, element 31-1 to 31-n*) that is sloped at 45 degrees respect to the first print direction (the main scanning direction or the traveling direction of the printhead) (*column 7, lines 39-45*) and the second print direction (*as shown in FIG. 2, the second print direction is the advance direction of the printing medium P on the platen (52), which is orthogonal to the travel direction of the printhead (30) across the printing medium P*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time invention was made to modify the inclination angle of the ejector array in the printhead disclosed by Fujimoto et al. to be at 45 degrees respect to the first and second print directions as disclosed by Minowa et al.

The motivation for doing so would have been to reduce the distance between adjacent pixels printed on the recording medium in order to improve resolution as taught by Minowa et al. (*column 7, lines 46-53*).

4. Claims 3, 5, 12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katagami et al. (US 2002/0105688 A1) in view of a legal precedent (*MPEP 2144.04 LEGAL PRECEDENT AS SOURCE OF SUPPORTING RATIONALE*).

Katagami et al. discloses the claimed invention as discussed in the second rejection and also teaches that the inclination angle  $\theta$  of the first ejector line is adjustable from 0 to 90 degrees respect to the first and second print direction (X and Y directions) (*FIG. 1*).

Katagami et al. does not specifically teach wherein the first line is at a 45-degree angle with respect to the first print direction and the second print direction (**Referring to claims 3, 12**),

and wherein the first design rule is the same as the second design rule (**Referring to claims 5, 14**).

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the inclination angle  $\theta$  of the first line being at 45 degrees respect to the first and second print direction to obtain the first spacing of the plurality of ejectors in the first print direction being the same as the second spacing of ejectors in the second print direction, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980). In this case, the equality of the first spacing and the second spacing would result of forming an IC pattern having the first design rule being the same as the second design rule.

#### ***Response to Arguments***

Applicant's arguments with respect to claims 1, 10 have been considered but are moot in view of the new ground(s) of rejection.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S. NGUYEN whose telephone number is (571)272-2151. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D. MEIER can be reached on (571)272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Camryn", is positioned above the date.

03/15/2006